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Keysight Technologies
34401A Digital Multimeter

Data Sheet

Product Discontinuance Notice

The 34401A DMM and all associated options will be discontinued December 1, 2016.
The last date this product can be ordered is November 30, 2016.

- For new product purchases, Keysight recommends the 34461A, 6½ digit Truevolt DMM.
- For more information, as well as to access to detailed migration guides, please visit **www.keysight.com/find/nextgenDMMs**
- To contact a product selection expert, visit **www.keysight.com/find/contactus**

Measurement capability

- 6½ digit resolution
- 10 measurement functions: DC/AC voltage, DC/AC current, 2- and 4-wire resistance, diode, continuity, frequency, period
- Basic accuracy: 0.0035% DC, 0.06% AC
- 1000 V max voltage input, 3 A max current input

System Capability

- 1000 readings/second
- 512 reading memory

Superior performance

The Keysight Technologies, Inc. 34401A multimeter gives you the performance you need for fast, accurate bench and system testing. The 34401A provides a combination of resolution, accuracy and speed that rivals DMMs costing many times more. 6½ digits of resolution, 0.0015% basic 24-hr dcV accuracy and 1,000 readings/s direct to GPIB assure you of results that are accurate, fast, and repeatable.

Use it on your benchtop

The 34401A was designed with your bench needs in mind. Functions commonly associated with bench operation, like continuity and diode test, are built in. A Null feature allows you to remove lead resistance and other fixed offsets in your measurements. Other capabilities like min/max/avg readouts and direct dB and dBm measurements make checkout with the 34401A faster and easier.

The 34401A gives you the ability to store up to 512 readings in internal memory. For troubleshooting, a reading hold feature lets you concentrate on placing your test leads without having to constantly glance at the display.

Use it for systems testing

For systems use, the 34401A gives you faster bus throughput than any other DMM in its class. The 34401A can send up to 1,000 readings/s directly across GPIB in user-friendly ASCII format.

You also get both GPIB and RS-232 interfaces as standard features. Voltmeter Complete and External Trigger signals are provided so you can synchronize to other instruments in your test system. In addition, a TTL output indicates Pass/Fail results when limit testing is used.

To ensure both forward and backward compatibility, the 34401A includes three command languages (SCPI, Keysight 3478A and Fluke8840A/42A), so you don't have to rewrite your existing test software. An optional rack mount kit is available.

Easy to use

Commonly accessed attributes, such as functions, ranges, and resolution are selected with a single button press.

Advanced features are available using menu functions that let you optimize the 34401A for your applications.

The included Keysight IntuiLink software allows you to put your captured data to work easily, using PC applications such as Microsoft Excel or Word to analyze, interpret, display, print, and document the data you get from the 34401A. You can specify the meter setup and take a single reading or log data to the Excel spreadsheet in specified time intervals. Programmers can use ActiveX components to control the DMM using SCPI commands.

3-year warranty

With your 34401A, you get full documentation, a high-quality test lead set, calibration certificate with test data, and a 3-year warranty, all for one low price.

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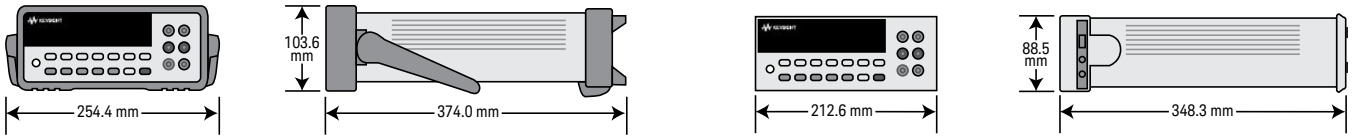
Accuracy Specifications ± (% of reading + % of range)[1]

Function	Range [3]	Frequency, etc.	24 hour [2] 23 ±1 °C	90 day 23 ±5 °C	1 year 23 ±5 °C	Temperature coefficient 0 – 18 °C 28 – 55 °C
DC voltage	100.0000 mV		0.0030 + 0.0030	0.0040 + 0.0035	0.0050 + 0.0035	0.0005 + 0.0005
	1.000000 V		0.0020 + 0.0006	0.0030 + 0.0007	0.0040 + 0.0007	0.0005 + 0.0001
	10.00000 V		0.0015 + 0.0004	0.0020 + 0.0005	0.0035 + 0.0005	0.0005 + 0.0001
	100.0000 V		0.0020 + 0.0006	0.0035 + 0.0006	0.0045 + 0.0006	0.0005 + 0.0001
	1000.000 V		0.0020 + 0.0006	0.0035 + 0.0010	0.0045 + 0.0010	0.0005 + 0.0001
True rms AC voltage [4]	100.0000 mV	3 – 5 Hz	1.00 + 0.03	1.00 + 0.04	1.00 + 0.04	0.100 + 0.004
		5 – 10 Hz	0.35 + 0.03	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004
		10 Hz – 20 kHz	0.04 + 0.03	0.05 + 0.04	0.06 + 0.04	0.005 + 0.004
		20 – 50 kHz	0.10 + 0.05	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
		50 – 100 kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
		100 – 300 kHz [6]	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.20 + 0.02
	1.000000 V to 750.000 V	3 – 5 Hz	1.00 + 0.02	1.00 + 0.03	1.00 + 0.03	0.100 + 0.003
		5 – 10 Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
		10 Hz – 20 kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.005 + 0.003
		20 – 50 kHz	0.10 + 0.04	0.11 + 0.05	0.12 + 0.04	0.011 + 0.005
		50 – 100 kHz [5]	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
		100 – 300 kHz [6]	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.20 + 0.02
Resistance [7]	100.0000 Ω	1 mA current source	0.0030 + 0.0030	0.008 + 0.004	0.010 + 0.004	0.0006 + 0.0005
	1.000000 kΩ	1 mA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0006 + 0.0001
	10.00000 kΩ	100 µA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0006 + 0.0001
	100.0000 kΩ	10 µA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0006 + 0.0001
	1.000000 MΩ	5.0 µA	0.002 + 0.001	0.008 + 0.001	0.010 + 0.001	0.0010 + 0.0002
	10.00000 MΩ	500 nA	0.015 + 0.001	0.020 + 0.001	0.040 + 0.001	0.0030 + 0.0004
	100.0000 MΩ	500 nA II 10 MΩ	0.300 + 0.010	0.800 + 0.001	0.800 + 0.001	0.1500 + 0.0002
DC current	10.00000 mA	< 0.1 V burden voltage	0.005 + 0.010	0.030 + 0.020	0.050 + 0.020	0.0020 + 0.0020
	100.0000 mA	< 0.6 V	0.010 + 0.010	0.030 + 0.005	0.050 + 0.005	0.0020 + 0.0005
	1.000000 A	< 1.0 V	0.050 + 0.010	0.080 + 0.010	0.100 + 0.010	0.0050 + 0.0010
	3.00000 A	< 2.0 V	0.100 + 0.010	0.120 + 0.020	0.120 + 0.020	0.005 + 0.0020
True rms AC current [4]	1.000000 A	3 – 5 Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
		5 – 10 Hz	0.30 + 0.04	0.30 + 0.04	0.30 + 0.04	0.035 + 0.006
		10 Hz – 5 kHz	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.015 + 0.006
	3.00000 A	3 – 5 Hz	1.10 + 0.06	1.10 + 0.06	1.10 + 0.06	0.100 + 0.006
		5 – 10 Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.035 + 0.006
		10 Hz – 5 kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
Frequency or period [8]	100 mV to 750 V	3 – 5 Hz	0.10	0.10	0.10	0.005
		5 – 10 Hz	0.05	0.05	0.05	0.005
		10 – 40 Hz	0.03	0.03	0.03	0.001
		40 Hz – 300 kHz	0.006	0.01	0.01	0.001
Continuity	1000.0 Ω	1 mA test current	0.002 + 0.030	0.008 + 0.030	0.010 + 0.030	0.001 + 0.002
Diode test [9]	1.0000 V	1 mA test current	0.002 + 0.010	0.008 + 0.020	0.010 + 0.020	0.001 + 0.002

1. Specifications are for 1 hr warm-up and 6½ digits, slow ac filter.
2. Relative to calibration standards.
3. 20% over range on all ranges except 1000 Vdc and 750 Vac ranges.
4. For sinewave input > 5% of range. For inputs from 1% to 5% of range and < 50 kHz, add 0.1% of range additional error.
5. 750 V range limited to 100 kHz or 8 x 107 Volt-Hz.
6. Typically 30% of reading error at 1 MHz.
7. Specifications are for 4-wire ohms function or 2-wire ohms using Math Null. Without Math Null, add 0.2 Ω additional error in 2-wire ohms function.
8. Input > 100 mV. For 10 to 100 mV inputs multiply % of reading error x 10.
9. Accuracy specifications are for the voltage measured at the input terminals only. 1 mA test current is typical. Variation in the current source will create some variation in the voltage drop across a diode junction.



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Measurement Characteristics

DC voltage	
Measurement method	Continuously integrating multi-slope III A-D converter
A-D linearity	0.0002% of reading + 0.0001% of range
Input resistance	
10 MΩ or 0.1V, 1 V, 10 V ranges	Selectable > 10,000 MΩ
100 V, 1000 V ranges	10 MΩ ±1%
Input bias current	< 30 pA at 25°C
Input protection	1000 V all ranges
dcV:dcV ratio accuracy	V_{input} accuracy + $V_{relevance}$ accuracy

True RMS AC voltage	
Measurement method	AC-coupled true rms-measures the ac component of the input with up to 400 Vdc of bias on any range
Crest factor	Maximum of 5:1 at full scale
Additional crest factor errors (non-sinewave)	Crest factor 1-2: 0.05% of reading
	Crest factor 2-3: 0.15% of reading
	Crest factor 3-4: 0.30% of reading
	Crest factor 4-5: 0.40% of reading
Input impedance	1 MΩ ± 2% in parallel with 100 pF
Input protection	750 Vrms all ranges

Resistance	
Measurement method	Selectable 4-wire or 2-wire Ohms
	Current source referenced to LO input
Maximum lead resistance (4-wire)	10% of range per lead for 100 Ω, 1 kΩ ranges
	1 kΩ per lead on all other ranges
Input protection	1000 V all ranges

DC current	
Shunt resistance	5 Ω for 10 mA, 100 mA
	0.1 Ω for 1 A, 3 A
Input protection	Externally accessible 3 A 250 V fuse
	Internal 7 A 250 V fuse

True RMS AC current	
Measurement method	Directly coupled to the fuse and shunt. ac coupled true rms measurement (measures the ac component only).
Shunt resistance	0.1 Ω for 1 A and 3 A ranges
Input protection	Externally accessible 3 A 250 V fuse
	Internal 7 A 250 V fuse

Frequency and period	
Measurement method	Reciprocal counting technique
Voltage ranges	Same as ac voltage function
Gate time	1 s, 100 ms, or 10 ms

Continuity/diode	
Response time	300 samples/s with audible tone
Continuity threshold	Selectable from 1 Ω to 1000 Ω

Measurement noise rejection 60 (50) Hz [1]	
dc CMRR	140 dB
ac CMRR	70 dB

Integration time and normal mode rejection [2]	
100 plc/1.67 s (2 s)	60 dB [3]
0 plc/167 ms (200 ms)	60 dB [3]
1 plc/16.7 ms (20 ms)	60 dB
< 1 plc/3 ms or 800 µs)	0 dB

Operating characteristics [4]

Function	Digits	Reading/s
dcV, dcl, and resistance	6½	0.6 (0.5)
	6½	6 (5)
	5½	60 (50)
	5½	300
	4½	1000
acV, acl	6½	0.15 slow (3 Hz)
	6½	1 medium (20 Hz)
	6½	10 fast (200 Hz) [5]
	6½	50
Frequency or period	6½	1
	5½	9.8
	4½	80

1. For 1 kΩ unbalanced in LO lead, ± 500 V peak maximum.
2. For power line frequency ± 0.1%.
3. For power line frequency ± 1% use 40 dB or ± 3% use 30 dB.
4. Reading speeds for 60 Hz and (50 Hz) operation.
5. Maximum useful limit with default settling delays defeated.
6. Speeds are for 4½ digits, delay 0, auto-zero and display OFF.

Measurement Characteristics *continued*

System speeds	
Configuration rates	26/s to 50/s
Autorange rate (dc Volts)	> 30/s
ASCII readings to RS-232	55/s
ASCII readings to GPIB	1000/s
Maximum internal trig rate	1000/s
Max. ext trig. rate to mem	1000/s

Triggering and memory	
Reading HOLD sensitivity	10%, 1%, 0.1%, or 0.01% of range
Samples/trigger	1 to 50,000
Trigger delay	0 to 3600 s: 10 µs step size
External trigger delay	< 1 ms
External trigger jitter	< 500 µs
Memory	512 readings

Math functions
NULL, min/max/average, dBm, dB, limit test (with TTL output)

Standard programming languages
SCPI (IEEE-488.2), Keysight 3478A, Fluke 8840A/42A

Accessories included
Test lead kit with probe, alligator and grabber attachments
Operating manual, service manual, test report and power cord

General specifications	
Power supply	100 V/120 V/220 V/240 V ±10%
Power line frequency	45 to 66 Hz and 360 to 440 Hz, automatically sensed at power-on
Power consumption	25 VA peak (10 W average)
Operating environment	Full accuracy for 0 to 55 °C, full accuracy to 80% R.H. at 40 °C
Storage temperature	–40 to 70 °C
Weight	3.6 kg (8.0 lbs)
Safety	Designed to CSA, UL-1244, IEC-348
RFI and ESD	MIL-461C, FTZ 1046, FCC
Vibration and shock	MIL-T-28800E, Type III, Class 5 (sine only)
Warranty	1 year

Ordering Information

Keysight 34401A multimeter accessories included: Test lead kit with probe, alligator, and grabber attachments, calibration certificate, test report, and power cord.Also includes CD with: IntuiLink software, IVI and VXI PnP drivers, Quick start tutorial, user's guide, command quick reference, service guide, and data sheet.

Options

34401A-A6J	ANSI Z540 compliant calibration

Accessories

Probes/Leads/Clip Accessories	
11059A	Kelvin probe set
11060A	Surface mount device (SMD) test probes
11062A	Kelvin clip set
34133A	Precision electronic test leads
34134A	DC coupled current probe
34136A	High voltage probe
34138A	Test lead set
34171B	Input terminal connector (sold in pairs)
34172B	Input calibration short (sold in pairs)
34330A	30 A current shunt
E2308A	5 k thermistor probe
Y1133A	Low-thermal external digital multimeter scanning kit

Rackmount kits

34190A Rackmount kit	Designed for use with only one instrument, mounted on either the left or the right side of the rack.
34191A 2U Dual flange kit	Secures the instrument to the front of the rack. This kit can be used with the 34194A dual lock link kit to mount two half-width, 2U height instruments side-by side.
34194A Dual lock link kit	Recommended for side-by-side combinations and includes links for instruments of different depths. This kit can be used with the 34191A 2U dual flange kit to mount two half-width, 2U height instruments side-by-side.

Other accessories

34131A	Hard transit case
34161A	Accessory pouch
34398A	RS-232 cable, 9 pin (f) to 9 pin (f)
E5810B	LAN/GPIB gateway

Änderungen und Irrtümer vorbehalten. dataTec 28-05-2015 | © Keysight Technologies 2015, May 21, 2015 | 5968-0162EN

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